

which the onset of perceptible buffeting occurs must be determined with the airplane in the cruise configuration for the ranges of airspeed or Mach number, weight, and altitude for which the airplane is to be certificated. The envelopes of load factor, speed, altitude, and weight must provide a sufficient range of speeds and load factors for normal operations. Probable inadvertent excursions beyond the boundaries of the buffet onset envelopes may not result in unsafe conditions.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-23, 35 FR 5671, Apr. 8, 1970; Amdt. 25-72, 55 FR 29775, July 20, 1990; Amdt. 25-77, 57 FR 28949, June 29, 1992]

§ 25.253 High-speed characteristics.

(a) *Speed increase and recovery characteristics.* The following speed increase and recovery characteristics must be met:

(1) Operating conditions and characteristics likely to cause inadvertent speed increases (including upsets in pitch and roll) must be simulated with the airplane trimmed at any likely cruise speed up to V_{MO}/M_{MO} . These conditions and characteristics include gust upsets, inadvertent control movements, low stick force gradient in relation to control friction, passenger movement, leveling off from climb, and descent from Mach to airspeed limit altitudes.

(2) Allowing for pilot reaction time after effective inherent or artificial speed warning occurs, it must be shown that the airplane can be recovered to a normal attitude and its speed reduced to V_{MO}/M_{MO} , without—

(i) Exceptional piloting strength or skill;

(ii) Exceeding V_D/M_D , V_{DF}/M_{DF} , or the structural limitations; and

(iii) Buffeting that would impair the pilot's ability to read the instruments or control the airplane for recovery.

(3) With the airplane trimmed at any speed up to V_{MO}/M_{MO} , there must be no reversal of the response to control input about any axis at any speed up to V_{DF}/M_{DF} . Any tendency to pitch, roll, or yaw must be mild and readily controllable, using normal piloting techniques. When the airplane is trimmed at V_{MO}/M_{MO} , the slope of the elevator control force versus speed curve need

not be stable at speeds greater than V_{FC}/M_{FC} , but there must be a push force at all speeds up to V_{DF}/M_{DF} and there must be no sudden or excessive reduction of elevator control force as V_{DF}/M_{DF} is reached.

(b) *Maximum speed for stability characteristics.* V_{FC}/M_{FC} . V_{FC}/M_{FC} is the maximum speed at which the requirements of §§ 25.143(g), 25.147(e), 25.175(b)(1), 25.177, and 25.181 must be met with flaps and landing gear retracted. Except as noted in § 25.253(c), V_{FC}/M_{FC} may not be less than a speed midway between V_{MO}/M_{MO} and V_{DF}/M_{DF} , except that for altitudes where Mach number is the limiting factor, M_{FC} need not exceed the Mach number at which effective speed warning occurs.

(c) *Maximum speed for stability characteristics in icing conditions.* The maximum speed for stability characteristics with the ice accretions defined in appendix C, at which the requirements of §§ 25.143(g), 25.147(e), 25.175(b)(1), 25.177, and 25.181 must be met, is the lower of:

(1) 300 knots CAS;

(2) V_{FC} ; or

(3) A speed at which it is demonstrated that the airframe will be free of ice accretion due to the effects of increased dynamic pressure.

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§ 25.255 Out-of-trim characteristics.

(a) From an initial condition with the airplane trimmed at cruise speeds up to V_{MO}/M_{MO} , the airplane must have satisfactory maneuvering stability and controllability with the degree of out-of-trim in both the airplane nose-up and nose-down directions, which results from the greater of—

(1) A three-second movement of the longitudinal trim system at its normal rate for the particular flight condition with no aerodynamic load (or an equivalent degree of trim for airplanes that do not have a power-operated trim system), except as limited by stops in the trim system, including those required by § 25.655(b) for adjustable stabilizers; or